

Salmonellosis (Non-typhoidal)

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Section 1

ABOUT THE DISEASE

A. Etiologic Agent

Salmonellosis refers to disease caused by any serotype of bacteria in the genus *Salmonella*, other than *Salmonella typhi* (the *Salmonella* species that causes typhoid fever).

B. Clinical Description

The most common symptoms of salmonellosis are diarrhea (sometimes bloody), stomach cramps, fever, nausea, and sometimes vomiting. Dehydration may be severe, especially among infants and the elderly, and invasive disease (enteric fever) may occur. The infection may also present as septicemia, abscess, arthritis, or cholecystitis.

C. Vectors and Reservoirs

Salmonella are widely distributed in animals, including livestock, pets, poultry, other birds, reptiles, and amphibians. While chronic human carriers are rare, chronic carriage is prevalent in certain animals, particularly birds and reptiles.

D. Modes of Transmission

Salmonella are transmitted via the fecal-oral route. The most common mode of transmission is ingestion of food or water that has been contaminated with human or animal feces. This includes raw or undercooked poultry, eggs and egg products, undercooked meats, and raw milk or milk products. However, any food contaminated with the bacteria can be a source of infection. For example, outbreaks have been traced to the consumption of raw fruits and vegetables contaminated during processing. In most circumstances, contaminated food must be subject to time and temperature conditions that allow reproduction of the bacteria to numbers that can cause disease in those ingesting the contaminated food. A large dose of organisms ($\geq 100,000$) is usually needed to cause infection, but the infectious dose may be lower for certain serovars and for certain susceptible individuals such as children, the elderly, and the immunocompromised. In addition, reptiles such as iguanas and lizards are chronic carriers of these bacteria and can be sources of infection. Person-to-person spread can also occur, especially among household contacts, preschool children in daycare, and the elderly and developmentally disabled living in residential facilities. Transmission can also occur from person-to-person through certain types of sexual contact (e.g., oral-anal contact).

E. Incubation Period

The incubation period for salmonellosis ranges from 6–72 hours, but is usually about 12–36 hours. However, incubation periods longer than three days have been documented.

F. Period of Communicability or Infectious Period

The disease is communicable for as long as the infected person excretes *Salmonella* bacteria in his/her stool. This can last from days to months, depending on the serovar, but rarely lasts more than one year. Treatment with antibiotics can prolong carriage by suppressing competing bacteria in the gastrointestinal tract.

G. Epidemiology

Salmonellosis has a worldwide distribution, with approximately 1.2 million cases occurring annually in the U.S. Incidence rate is highest among infants and children under five years of age. About 60–80% of cases are sporadic, but large outbreaks have occurred in institutional settings and from common food sources. The largest common-vehicle outbreak of salmonellosis ever recognized in the U.S. was caused by ice cream made by a national producer from premix that had been transported in contaminated tanker trucks. In Massachusetts, *S. Enteritidis* and *S. Typhimurium* account for over 50% of *Salmonella* serovars (strains) isolated.

H. Bioterrorist Potential

Salmonella are listed by the Centers for Disease Control and Prevention (CDC) as Category B bioterrorist agents. If acquired and properly disseminated, *Salmonella* could cause serious public health challenges.

Section 2

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report isolation of *Salmonella* species from any clinical specimen.

Note: For Salmonella Typhi, see the chapter titled “Typhoid Fever.” See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Public Health Laboratory (MA SPHL), will test stool specimens for the presence of *Salmonella* and will perform confirmatory testing and serotyping on isolates from clinical specimens submitted by other laboratories. In addition, the MA SPHL requires submission of all *Salmonella* isolates for serotyping and PFGE testing for disease surveillance purposes. MA SPHL will soon be able to perform whole genome sequencing on salmonella isolates. For more information contact the MA SPHL at (617) 983-6607.

The MA SPHL will test implicated food items from a cluster or outbreak. See Section 4 for more information or call the MA SPHL Food Microbiology Laboratory at (617) 983-6610.

Section 3

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify whether the case may be a source of infection for other persons (e.g., a diapered child, daycare attendee, or food handler), and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a restaurant or a commercially-distributed food product), and to stop transmission from such sources.

B. Laboratory and Health Care Provider Reporting Requirements

Salmonellosis is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of salmonellosis, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *Salmonella* infection shall report such evidence directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that salmonellosis is reportable to the LBOH and that each LBOH must report any confirmed case of salmonellosis or suspect case of salmonellosis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Infectious Disease and Laboratory Sciences (BIDLS), Office of Integrated Surveillance and Informatics Services (ISIS) via MAVEN. Refer to the List of Diseases Reportable to Local Boards of Health for information on prioritization and timeliness requirements of reporting and case investigation

<http://www.mass.gov/eohhs/docs/dph/cdc/reporting/rprtbldiseases-lboh.pdf>

Case Investigation

It is the responsibility of the LBOH to complete all questions in each of the question packages by interviewing the case and others who may be able to provide information. Much of the information required can be obtained from the health care provider or from the medical record.

Calling the provider

If the case was hospitalized (i.e. reporting facility is a hospital), call infection control at the named hospital. A list of infection preventionists can be found in the help section of MAVEN. If the case was seen at a clinician's office, ask to speak to a nurse working with the ordering provider.

Calling the case or parent/guardian of the case

Before calling the case, review the disease fact sheet by clicking on the Help Button located in MAVEN and review all the information in this chapter. The call may take a few minutes, so in order to maximize the chance of getting the information needed, it might be good to note the potential length of the call with your contact, and offer the opportunity to call back when it is more convenient. Asking questions about

how the case or child is feeling may get the case or parent talking. If you are unable to answer a question they have, don't hesitate to call the Division of Epidemiology and Immunization at 617-983-6800 for assistance, and call the case back with the answer later. People are often more than willing to talk about their illness, and they may be very happy to speak with someone who can answer their questions.

Using MAVEN

Administrative Question Package

Monitor your "Online LBOH Notification for non-Immediate Disease" workflow in MAVEN for any new cases of *Salmonellosis*. Once a new event appears in this workflow, open the Administrative Question Package (QP) and under the "Local Health and Investigation" section, answer the first question "**Step 1** - LBOH acknowledged" by selecting "Yes". The "LBOH acknowledged date" will then auto populate to the current day. Completing this first step will move the event out of this workflow and into your "Online LBOH notified but Case Report Forms (CRF) are pending" workflow. Note the date you started your investigation by answering "**Step 2** - Investigation started" as "Yes" and then note the date where shown. Record your name, agency, and phone numbers where shown in "**Step 3** - LBOH/Agency Investigator."

Demographic Question Package

Record all demographic and employment information. It is particularly important to complete the Race/Ethnicity and Occupation questions.

Clinical Question Package

Complete the "Diagnosis/Clinical Information" section, providing the diagnosis date, symptom information and date of symptom onset, hospitalizations, and other medical information

Risk Exposure/Control & Prevention Question Package

Accurately record all risk questions regarding travel and consumption of any high risk foods. As you enter data into MAVEN, additional questions will appear for you to answer regarding risk/exposure. When asking about exposure history (e.g., food, travel, activities), if possible, use the entire incubation period range of salmonellosis (6–72 hours). Specifically, however, focus on the 12–36 hours prior to the case's onset, which is the usual range.

Completing Your Investigation

1. If you were able to finish the case investigation and follow-up is complete, mark "**Step 4** - Case Report Form Completed" as "Yes" and then choose Local Board of Health (LBOH) -Ready for MDPH review for the Completed by variable.
2. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please complete "**Step 4** - Case Report Form Completed" as "No" and then choose a primary reason why the case investigation was not completed from the choices provided in the primary reason answer variable list.
3. If you are not online for MAVEN you may submit a paper case report form. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to obtain a copy of the case report form and to confirm receipt of your fax.

The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

Section 4

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (105 CMR 300.200)

Food handlers with salmonellosis must be excluded from work.

Note: A case of salmonellosis is defined by the reporting criteria in Section 2A of this chapter.

Minimum Period of Isolation of Patient

After diarrhea has resolved, food handlers may only return to work after producing one negative stool specimen. If the case has been treated with an antimicrobial, the stool specimen shall not be collected until at least 48 hours after cessation of therapy. In outbreak circumstances, a second consecutive negative stool specimen will be required prior to returning to work.

Minimum Period of Quarantine of Contacts

Contacts with diarrhea who are food handlers shall be considered the same as a case and shall be handled in the same fashion. In outbreak circumstances, asymptomatic contacts who are food handlers shall be required to produce two negative stool specimens 24 hours apart. Otherwise, there are no restrictions.

Note: A food handler is any person directly preparing or handling food. This can include a patient care or childcare provider.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Daycare

Since salmonellosis may be transmitted from person-to-person through fecal-oral transmission, it is important to follow-up on cases in daycare settings. General recommendations include:

- Children with *Salmonella* infection who have diarrhea should be excluded until their diarrhea is resolved.

- Children with *Salmonella* infection who have no diarrhea and are not otherwise ill may be excluded or may remain in the program if special precautions are taken.
- Most staff in childcare programs are considered food handlers. Those with *Salmonella* in their stool (symptomatic or not) can remain on site but must not prepare food or feed children until their diarrhea is gone and they have one negative stool test (collected at least 48 hours after completion of antibiotic therapy, if antibiotics are given) (per *105 CMR 300.200*).
- Notifying parents/guardians of attendees should be considered when cases of salmonellosis occur in children or staff. Licensed daycare facilities must notify all parents in accordance with Department of Public Health recommendations when any communicable disease or condition has been introduced into the program (606 CMR 7.11). MDPH epidemiologists are available to help determine whether notification is recommended and sample letters are available from the Division of Epidemiology and Immunization at (617) 983-6800.

School

Since salmonellosis may be transmitted from person-to-person through fecal-oral transmission, it is important to follow up on cases in school settings. The MDPH [Comprehensive School Health Manual](#) provides detailed information on case follow-up and control in a school setting. General recommendations include:

- Students or staff with *Salmonella* infection who have diarrhea should be excluded until their diarrhea is resolved.
- Students or staff with *Salmonella* who do not handle food, have no diarrhea or have mild diarrhea, and are not otherwise sick may remain in school if special precautions are taken.
- Students or staff who handle food and have *Salmonella* infection (symptomatic or not) must not prepare food until their diarrhea is gone and they have 1 negative stool specimen (collected at least 48 hours after completion of antibiotic therapy, if antibiotics are given) (per *105 CMR 300.200*).
- The school nurse and school physician should consult with the LBOH and the MDPH epidemiologists to determine whether some or all parents/guardians and staff should be notified. Parent/guardian notification should be discussed with the school administrator prior to initiation. Sample letters are available from the Division of Epidemiology and Immunization at (617) 983-6800.

Refer to Chapter 8 of the MDPH [Comprehensive School Health Manual](#) for complete guidelines on handling diseases spread through the intestinal tract.

Community Residential Programs

Actions taken in response to a case of salmonellosis in a community residential program will depend on the type of program and the level of functioning of the residents.

In long-term care facilities, residents with salmonellosis should be placed on standard (including enteric) precautions until their symptoms subside and they test negative for *Salmonella*. Refer to the MDPH Division of Epidemiology and Immunization's MDPH Division of Epidemiology and Immunization Long Term Care

Infection Control Guidelines

<http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/providers/infection-control.html> for further actions.

Staff members who give direct patient care (e.g., feed patients, give mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions under *105 CMR 300.200*. See Section 4A for more information. In addition, staff members with *Salmonella* infection who are not food handlers should consider not working until their diarrhea is resolved.

In residential facilities for the developmentally disabled, staff and clients with salmonellosis must refrain from handling or preparing food for other residents until their diarrhea has subsided and they have one negative stool specimen for *Salmonella* (collected at least 48 hours after completion of antibiotic therapy, if antibiotics are given) (per *105 CMR 300.200*). In addition, staff members with *Salmonella* infection who are not food handlers should consider not working until their diarrhea is resolved.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases of salmonellosis in your city/town is higher than usual or if you suspect an outbreak, investigate to determine the source of infection and the mode of transmission. A common vehicle (e.g., water, food, or association with a daycare center) should be sought, and applicable preventive or control measures should be instituted. Control of person-to-person transmission requires special emphasis on personal hygiene and sanitary disposal of feces. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

D. Preventive Measures

Environmental Measures

Implicated food items must be removed from consumption. A decision about testing implicated food items can be made in consultation with the Bureau of Environmental Health Food Protection Program (FPP) or the MDPH Division of Epidemiology and Immunization. The FPP can help coordinate pickup and testing of food samples. If a commercial product is suspected, the FPP will coordinate follow up with relevant outside agencies. The FPP can be reached at (617) 983-6712.

Note: The role of the FPP is to establish policy and to provide technical assistance with the environmental investigation, such as interpreting the Massachusetts Food Code, conducting a Hazard Analysis and Critical Control Point (HACCP) risk assessment, initiating enforcement actions, and collecting food samples.

The general policy of the MA SPHL is to test only food samples implicated in suspected outbreaks, not in single cases (except when botulism is suspected). The LBOH may suggest that the holders of food implicated in single case incidents locate a private laboratory that will test food or store the food in their freezer for a period of time in case additional reports are received. However, in certain circumstances, a

single, confirmed case with leftover food that had been consumed within the incubation period may be considered for testing.

Note: Refer to the MDPH Foodborne Illness Investigation and Control Reference Manual for comprehensive information on investigating foodborne illness complaints and outbreaks at <http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/food-safety/foodborne-illness/tools/foodborne-illness-investigations-and-control.html>. For the most recent changes to the Massachusetts Food Code, contact the FPP at (617) 983-6712 or through the MDPH website at www.mass.gov/dph/fpp.

Personal Preventive Measures/Education

To avoid exposure to *Salmonella*, recommend that individuals:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, and after touching pets or other animals (especially reptiles).
- Wash the child's hands as well as their own hands after changing diapers, and dispose of feces in a sanitary manner.
- Wash hands thoroughly and frequently when ill with diarrhea or when caring for someone with diarrhea. Hands should be scrubbed for at least 15–20 seconds after cleaning the bathroom; after using the toilet or helping someone use the toilet; after changing diapers; before handling food; and before eating.
- Keep food that will be eaten raw, such as vegetables, from becoming contaminated by animal-derived food products.
- Avoid letting infants or young children touch reptiles, such as turtles or iguanas, or their cages.
- If elderly or immunocompromised, avoid reptiles when choosing pets.
- In a daycare or school, do not use reptiles as classroom pets.
- Make sure to thoroughly cook all food products from animals, especially poultry and eggs, and avoid consuming raw or cracked eggs, unpasteurized milk, or other unpasteurized dairy products.

Discuss transmission risks that may result from oral-anal sexual contact. Latex barrier protection (e.g., dental dam) may prevent the spread of *Salmonella* to a case's sexual partners and may prevent exposure to and transmission of other fecal-oral pathogens.

"Salmonella and Salmonellosis from Reptiles" Public Health fact sheets are available from the

MDPH Division of Epidemiology and Immunization or on the MDPH website at <http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/factsheets.html> The Salmonella Public Health Fact Sheet is also available in other languages.

ADDITIONAL INFORMATION

The formal CDC surveillance case definition for salmonellosis is the same as the criteria outlined in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at <http://wwwn.cdc.gov/nndss/conditions/salmonellosis/case-definition/2012/>

REFERENCES

American Academy of Pediatrics. [*Salmonella* Infections.] In: Pickering L.K., ed. *Red Book: 2015 Report of the Committee on Infectious Diseases, 30th Edition*. Elk Grove Village, IL, American Academy of Pediatrics; 2015: 695-702.

CDC. Case Definitions for National Notifiable Disease Surveillance System. 2012 Case definition. . "Salmonellosis: Frequently Asked Questions." Centers for Disease Control and Prevention. September 27, 2004.

Evans, A., Brachman, P., eds. *Bacterial Infections of Humans; Epidemiology and Control*. New York, Plenum Publishing, 1998.

Hennessy, T., et al. A National Outbreak of *Salmonella enteritidis* Infections from Ice Cream. *NEJM*. 1996; 334(20): 1281–1286.

Heymann, D., ed. *Control of Communicable Diseases Manual, 20th Edition*. Washington, DC, American Public Health Association, 2015.

MDPH. *Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements*. MDPH, Promulgated December 6, 2013.